National Snow and Ice Data

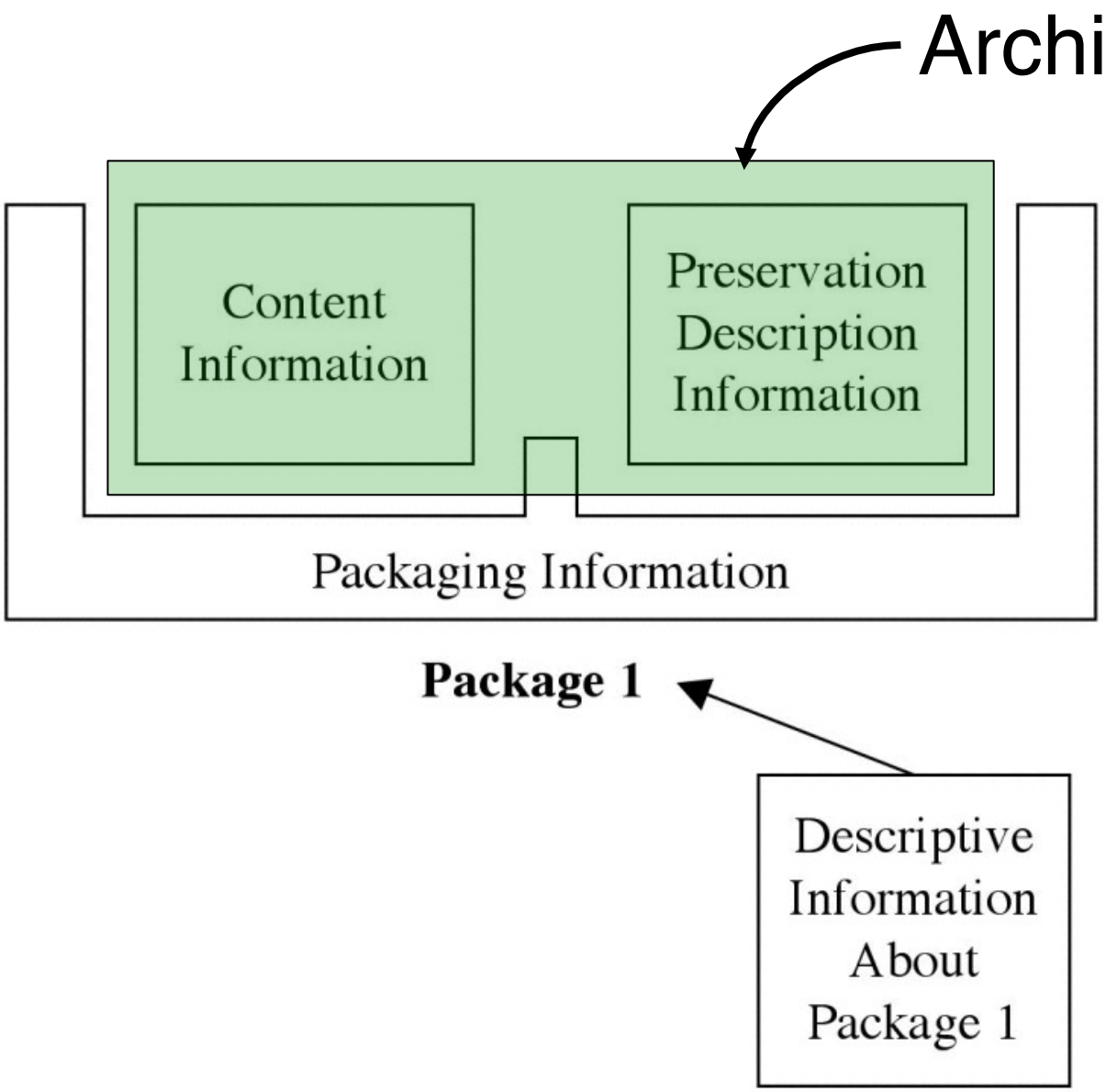
Supporting Cryospheric Research S

MODIS Case Study:

Is NASA Doing Anything Usefu

with Provenance?

R. Duerr



[1] Reference Model for an Open Archival Information System (OAIS), CCSDS 650.0-B-1, Blue Book, January 2002.

ontent Information

The data object to be preserved

Information that describes the data object

- Typically interpreted as the syntax and semantics of the file structure

reservation Description Information

Provenance – Origin or source of the data, any changes that have taken place since, and who has had custody of it

Fixity – the authentication mechanisms (with keys) needed to ensure that data object has not been altered in an undocumented manner

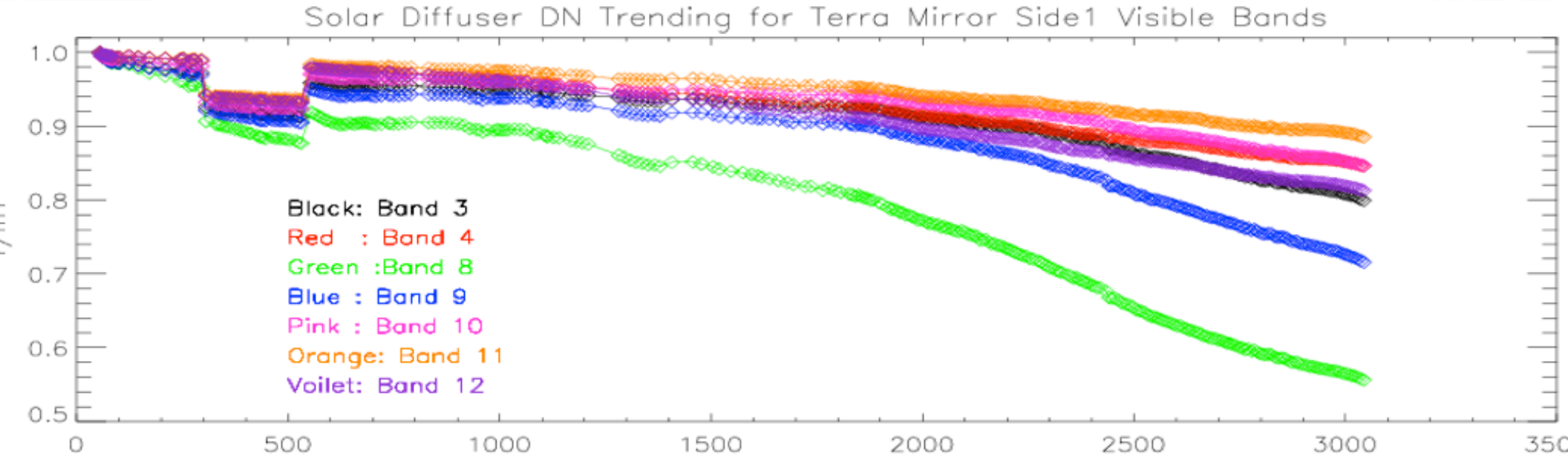
Reference – identification mechanisms and values

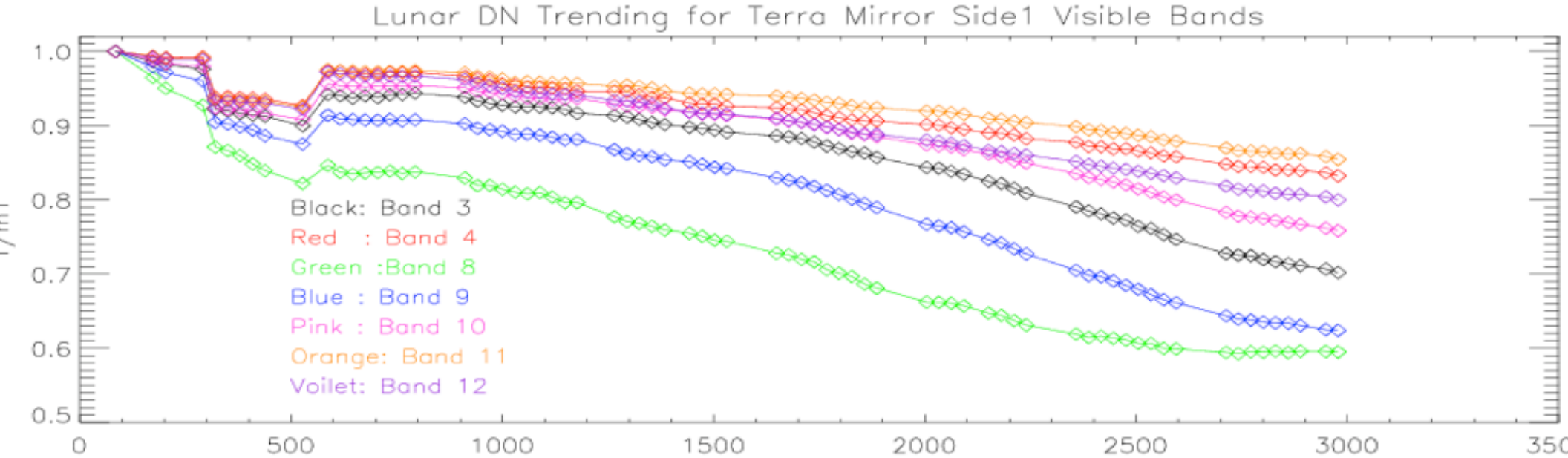
Context – relation of the object to its environment

- Instrument/sensor characteristics including pre-flight or pre-operational performance measurements (e.g., spectral response, noise characteristics, etc.)
- Instrument/sensor calibration data and method
- Processing algorithms and their scientific basis, including complete description of any sampling or mapping algorithm used in creation of the product (e.g., contained in peer-reviewed papers, in some cases supplemented by thematic information introducing the data set or derived product)
- Complete information on any ancillary data or other data sets used in generation or calibration of the data set or derived product

- Processing history including versions of processing source code corresponding to versions of the data se or derived product held in the archive
- Quality assessment information
- Validation record, including identification of validation data sets
- In the case of earth based data, station location and any changes in location, instrumentation, controlling agency, surrounding land use and other factors which could influence the long-term record
- A bibliography of pertinent Technical Notes and article including refereed publications reporting on research using the data set
- Information received back from users of the data set product

Terra RSB Response Trending (Moon/SD)



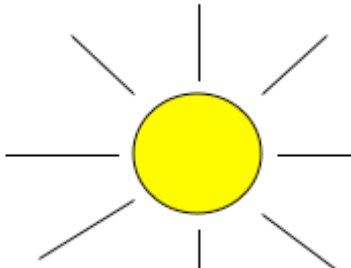


SD and Lunar responses (trending) are used to track MODIS scan mirror reflection versus scan angle (RVS)

MODIS Calibration Activities

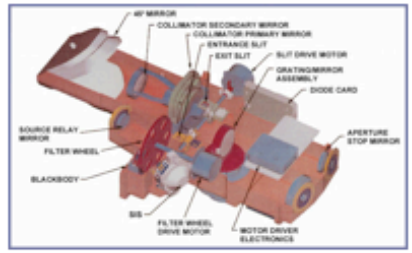
BB (quarterly)
SD/SDSM (weekly first year to bi-weekly)
SRCA (monthly radiometric, bi-monthly spatial, quarterly spectral)
Maneuvers (roll: monthly **Moon**; yaw: 2 for Terra and 1 for Aqua; pitch: 2 for Terra)

SDSM

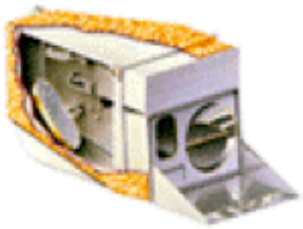


Solar Diffuser

SDSM

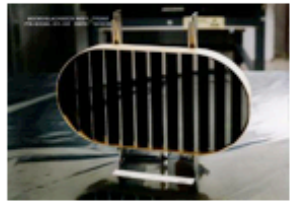


SRCA



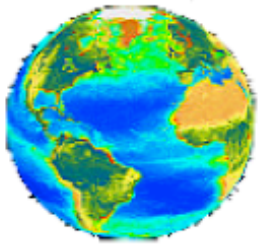
Scan Mirror

Blackbody



Space View

Moon



SRCA is currently operated at reduced frequencies (30W configuration removed). This has no impact on radiometric calibration.

Starting from July 2, 2003, Terra SD door fixed at open with SD screen down; more efforts for SD calibration data analysis

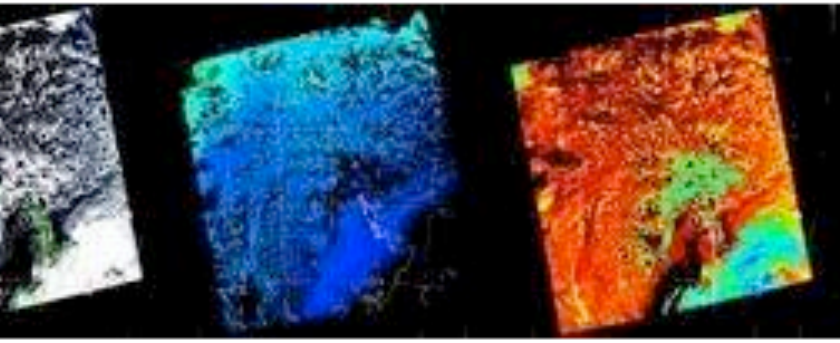
ALGORITHMS

Algorithm Theoretical Basis Documents (ATBD's) are being developed for every EOS (Earth Observing S instrument product including MODIS. With ATBD's, both physical theory and the mathematical procedures possible assumptions are being applied for the calculations that have to be made to convert the radiances received by the instruments to geophysical quantities. The geophysical quantities are then available to the scientific community for studies of the various characteristics of the Earth system.

(Because ATBD numbers were organized sequentially and more than one product may be derived from o ATBD, ATBD numbering schemes do not necessarily correspond product numbering schemes.)

- Level 1 ATBDs
- Atmosphere ATBDs
- Land ATBDs
- Ocean ATBDs
- Validation ATBDs

Curator: Brandon Maccherone
NASA Official: Shannell Cardwell



LAADS Web

Level 1 and Atmosphere Archive and Distribution Sys

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Search for Level 1 and Atmosphere Products

w the file names of the products for which you are searching, you may also search for file names.

uct Selection

select one or more products: + Vie

e/Instrument:

MODIS ○ Aqua MODIS ○ Combined Terra & Aqua MODIS ○ Ancillary Data ◉

ary Products

cts:

XMNT - DAO V4 Late Look special subset daily global climatology parameters
S_0ZF - One Degree Global Data Assimilation System Data from NOAA NCEP
- NSIDC Near Real-Time Global Ice and Snow Extent
NEEP - TOMS Column Ozone Earth Probe
AILY - Daily TOVS Ozone from NOAA NCEP
TTNR - PM1 2hour refined Spacecraft attitude data
EPHND - PM1 24hour Spacecraft ephemeris/orbit data files to be read via SDP Toolkit, Binary Format
NSST - Reynolds Weekly Sea Surface Temperature from NOAA NCEP
ICE - NCEP Ice Concentration
ST - NCEP TOVS & SBUV/2 Column Ozone GRIB Format Daily L3 Global 1Deg Lat/Lon

A:
- PSAName: **QAPERCENTGOODQUALITY**
- PSAValue: **99**

A:
- PSAName: **QAPERCENTOTHERQUALITY**
- PSAValue: **1**

A:
- PSAName: **HORIZONTALTILENUMBER**
- PSAValue: **16**

A:
- PSAName: **VERTICALTILENUMBER**
- PSAValue: **02**

A:
- PSAName: **TileID**
- PSAValue: **51016002**

A:
- PSAName: **SNOWCOVERPERCENT**
- PSAValue: **84**

ule:
utPointer: **MOD10L2G.A2008124.h16v02.005.2008127094528.hdf, MODMGGAD.A2008124.h16v02.005.2008127080730.hd**
DPTHKM.A2008124.h16v02.005.2008127080613.hdf, MOD09GHK.A2008124.h16v02.005.2008127085445.hdf,
D12Q1.A2001001.h16v02.004.2004358134240.hdf

MODAPS Operational PGE Versions

Updated Fri May 30 03:00:10 EDT 2008

Welcome to the MODAPS Operational PGE Versions web page. This page is intended for the limited number of MODIS supported and MODIS supplied with MODIS PGE source code by the MODIS Science Data Support Team. Some PGEs are not yet available in source code form. Re added to this page when they are approved by the MODIS science team.

The version of each PGE listed below is the default PGE version in forward operations in the MODAPS data processing system as of the updat information is normally updated daily. The version of a PGE used for Aqua and Terra processing may be different and both will be available, wit static coefficient files, on the FTP site listed below if they have been released by the science team. Updates to this web page and to the FTP directo they can have different version information for some PGEs for several hours each day. Updates are scheduled for the dark of the night, so this business hours.

The PGEs listed below are separated by satellite/instrument and science discipline and are listed by the recipes used to process data in the MO group of PGE versions that is, consistent with one another, tested as a unit, and run together in the MODAPS system. Each PGE is linked to the cur history file lists all the changes from version to version. The history file may refer to PGE versions that have higher version numbers than those listed in testing. The "Notes" column will list changes in the PGE during the previous three months that affected either the production rules used to run th in the type of input data files, including ancillary data.

We hope this page is useful to you. If you have any suggestions or comments please contact the webmaster, Karen Horrocks, or your group's contac

PGE Source Code FTP Site (username and password required): modular.nascom.nasa.gov:9001

Try ftp://username@modular.nascom.nasa.gov:9001 with your username if your browser does not ask for your username and password. To g Masuoka.

[Terra MODIS: Level1 | Atmosphere | Land | Ocean] [Aqua MODIS: Level1 | Atmosphere | Land | Ocean]

Terra MODIS Level 1 PGE Versions

Recipe	Recipe Version	PGE	Notes	Installation Date	PGE Version	PGE Description
AM1M_0	3.3.80	PGE01		2008-04-28	5.0.18	Level 1A Raw Radiances and Geolocation
		PGE71		2006-12-11	5.0.1	Level 1A Oceans Sub-setting
AM1M_1	3.3.43	PGE02		2007-03-30	5.0.6	Level 1B Calibration
		PGE92		2006-08-18	5.0.0	L1a splitter process
		PGE93		2006-08-18	5.0.1	L1b subsampler
AM1M_1c	3.3.14	PGE03		2006-08-18	5.2.3	Level 2 Cloud Mask/Atmospheric Profiles

Terra MODIS Atmosphere PGE Versions

Recipe	Recipe Version	PGE	Notes	Installation Date	PGE Version	PGE Description
AM1M_A1	3.3.56	PGE04		2008-01-02	5.3.8	Level 2 Atmosphere
		PGE06		2007-09-07	5.12.4	Level 2 Clouds

Current Granule/Row is 1 of 306: First | Previous | Next | Last

Product Quality Documentation for MOD10A1, C5

Collection C5

ParameterName: All				
Time	EndDateTime	ScienceQualityFlag	ScienceQualityFlagExplanation	Comments
	2000 076 (03/16/00) 18:40:00	Inferred Passed	Overall snow is mapped with reasonable accuracy. However, errors in snow mapping from MOD10_L2 are passed into the MOD10A1 product. Discretion should be exercised in use of this product.	Snow mapping errors may occur o the perimeters of snow fields, cloud edges and water boundaries.
	2000 076 (03/16/00) 19:10:00	Suspect	Data scans may have been shifted due to shift in the geolocation resulting from the spacecraft manuever during this period.	
	2000 076 (03/16/00) 20:15:00	Inferred Passed	Overall snow is mapped with reasonable accuracy. However, errors in snow mapping from MOD10_L2 are passed into the MOD10A1 product. Discretion should be exercised in use of this product.	Snow mapping errors may occur o the perimeters of snow fields, cloud edges and water boundaries.
	2000 076 (03/16/00) 20:50:00	Suspect	Data scans may have been shifted due to shift in the geolocation resulting from the spacecraft manuever during this period.	

tus for: Snow Cover/Sea Ice (MOD10/29)

eral Accuracy Statement

ation at stage 2 has been achieved for the snow-cover product (MOD10). The accuracy of the MODIS s
t product varies with vegetation type, but the overall accuracy has been assessed at 92% in various pee
wed publications.

ation at stage 2 has been accomplished for the MODIS 1-km resolution Sea Ice product (MOD29). Maps
tent and ice-surface temperature (IST) under clear skies have RMS errors of 1.2-1.3K during the "cold
ns," or when there is no surficial melt on the sea ice.

uct status updated: September 2006
uct version: Collection 4

porting Studies:

Sea Ice Surface Temperature Product From MODIS
or: Hall, D.K., J. R. Key, K. A. Casey, G. A. Riggs, D. J. Cavalieri
ce: IEEE Transactions on Geoscience and Remote Sensing, Vol. 42, No. 5, May 2004
Summary Results From This Document

Comparison of MODIS Daily Global Fractional Snow Cover Maps at 0.05 and 0.25 Degree Resolutions
or: George A. Riggs, Nicolo Digirolamo, Dorothy K. Hall
ce: 62nd EASTERN SNOW CONFERENCE Waterloo, ON, Canada 2005
Summary Results From This Document

nited States

tory

on: National Oceanic and Atmospheric Administration

click image to enlarge

156.609 W, 11 m asl (36 ft asl)

an Endres (Daniel.J.Endres@noaa.gov)

w.esrl.noaa.gov/gmd/obop/brw

diation Measurement (ARM) site at the North Slope of Alask

on: United States Department of Energy

, 156.6156 W (Barrow); 70.4722 N, 157.4078 W (Atqasuk)

Mark D. Ivey (mdivey@sandia.gov)

w.arm.gov/sites/nsa.stm

a web links are below the Table of Measurements

Measurements

SA	
egory	PIs/Organization
ry	*National Oceanic and Atmospheric Administration*
ace	
	S. Oltmans (NOAA)
	T. Conway, E. Dlugokencky, J. Elkins, P. Novelli, S. Oltmans, and K. Thoning (NOAA); B. Vaughn (INSTAAR)

INTERNATIONAL ARCTIC SYSTEMS FOR OBSERVING THE ATMOSPHERE
IASOA

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  - Pallas & Sodankyla
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Arctic Calendar

ARCUS/IASC/AOSB Arctic Calendar

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Observatories Home Page

Welcome to the IASOA Observatories page. Click on a station name to see det for that station.

For a table that gives an overall comparison of the station measurements, visit At-A-Glance page.

Abisko, Sweden (68.35 N, 18.82 E)

Alert, Canada (82.5017 N, 62.3297 W)

Barrow, USA (71.323 N, 156.609 W)

Cherskii, Russia (69 N, 161 E)

Eureka, Canada (80.050 N, 86.417 W)

Ny-Aalesund, Norway (78.908 N, 11.881 E)

Pallas, Finland (67.974 N, 24.116 E)

Sodankyla, Finland (67.37 N, 26.65 E)

Research

e contains a list of citations of published research using MODIS snow and sea ice products since 2000. This list is sorted in reverse order with entries listed in alphabetic order within each year period. Please contact NSIDC User Services if you have a reference you would n this page. Use the tool bar below to navigate around this Web page.

9 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 | 2000 | 1999 | 1998

Related Resources

The MODIS Snow and Sea
Mapping Project: Publicat

NASA's related publications site
MODIS snow and sea ice globa
project.

nd Bardossy, A. 2009. Cloud Removal Methodology from MODIS Snow Cover Product. *Hydrology and Earth System Sciences* 13(7):

W., et al. 2009. Large-Scale Monitoring of Snow Cover and Runoff Simulation in Himalayan River Basins using Remote Sensing. *Remote Sensing of Environment* 113(1): 40-49.

. Goswami, Ajanta, Saraf, A. K. 2009. Role of Elevation and Aspect in Snow Distribution in Western Himalaya. *Water Resources Management* 23(1): 71-83.

al. 2009. Methoden der optischen Fernerkundung zur Erfassung von Bedeckungsmustern der Schneedecke als Eingangsdaten für hydrologische Eis- und Schneeschmelzmodell ing Methods for Studying Snow-Cover Patterns as Input Data for Hydrological Ice and Snow-Melt Models]. *Österreichische Wasser - und Abfallwirtschaft* 61(1-2): 25-33.

G., Dybbroe, A. 2009. Evaluation of Arctic Cloud Products from the EUMETSAT Climate Monitoring Satellite Application Facility based on CALIPSO-CALIOP Observations. *Atmo l Physics Discussions* 9: 16755-16810.

nichi, et al. 2009. Radar Signatures Beneath a Surface Topographic Lineation Near the Outlet of Kamb Ice Stream and Engelhardt Ice Ridge, West Antartica. *Annals of Glaciology*

h P. 2009. Reconstructing Snow Water Equivalent in the Rio Grande Headwaters using Remotely Sensed Snow Cover Data and a Spatially Distributed Snowmelt Model. *Hydrolo urnal* 23(7): 1076-1089.

nsa, J., Blöschl, G. 2009. Bestimmung des Schneevorrates in Einzugsgebieten mittels Fernerkundungsmethoden [Using Methods of Remote Sensing for Determining Snow Res e Wasser - und Abfallwirtschaft* 61(7-8): 125-131. doi: 10.1007/s00506-009-0115-3.

L. 2009. MODIS/Terra Observed Snow Cover over the Tibet Plateau: Distribution, Variation, and Possible Connection with the East Asian Monsoon (EASM). *Theoretical and Appli ournal* 97(3-4): 265-278.

al. 2009. Development and Assessment of Broadband Surface Albedo from Clouds and the Earth's Radiant Energy System Clouds and Radiation Swath Data Product. *Journal of* (D08125), doi:10.1029/2008JD010669.

Data Errors found

Quality updates

Things that need further explanation

Metadata updates/additions?

Community contributed metadata????